



“Emerging markets and climate change”

City of London Festival / Gresham College

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Joint work with David Frame and Vivid Economics

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Some environmental economics research

- 1. The role of emerging markets in addressing climate change**
2. The ethics of carbon trading
3. Multiple climate instruments: how not to do it?
4. The economics of biodiversity



Agenda

1. Preliminaries
2. Emerging markets and climate change
3. Self-interested climate policy: some new perspectives
4. International collaboration vs. competition for the “low-carbon” economy
5. Conclusion



Some preliminaries

1. Climate change science
2. Climate change economics
3. G20 emerging market (GEM) countries



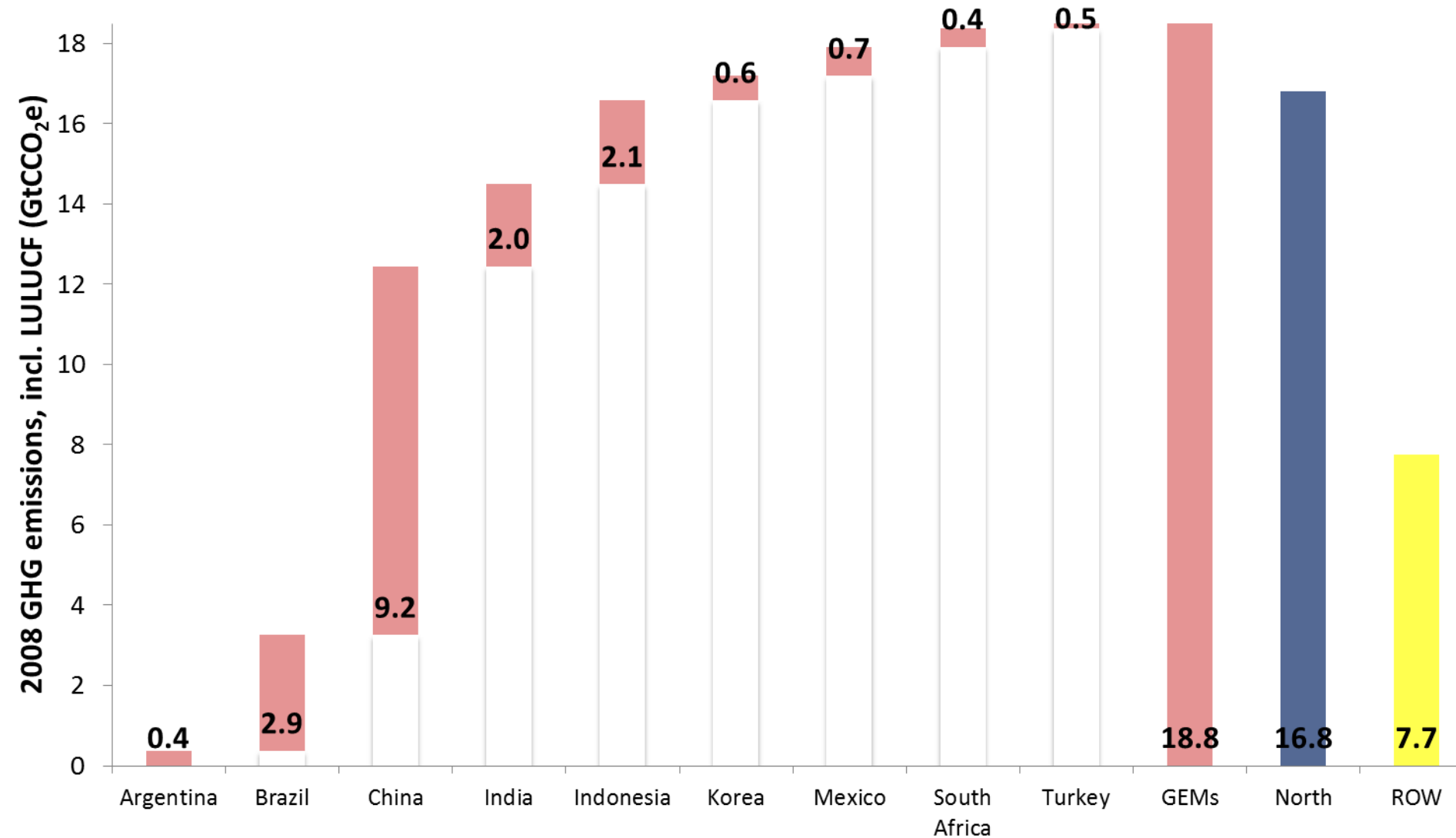
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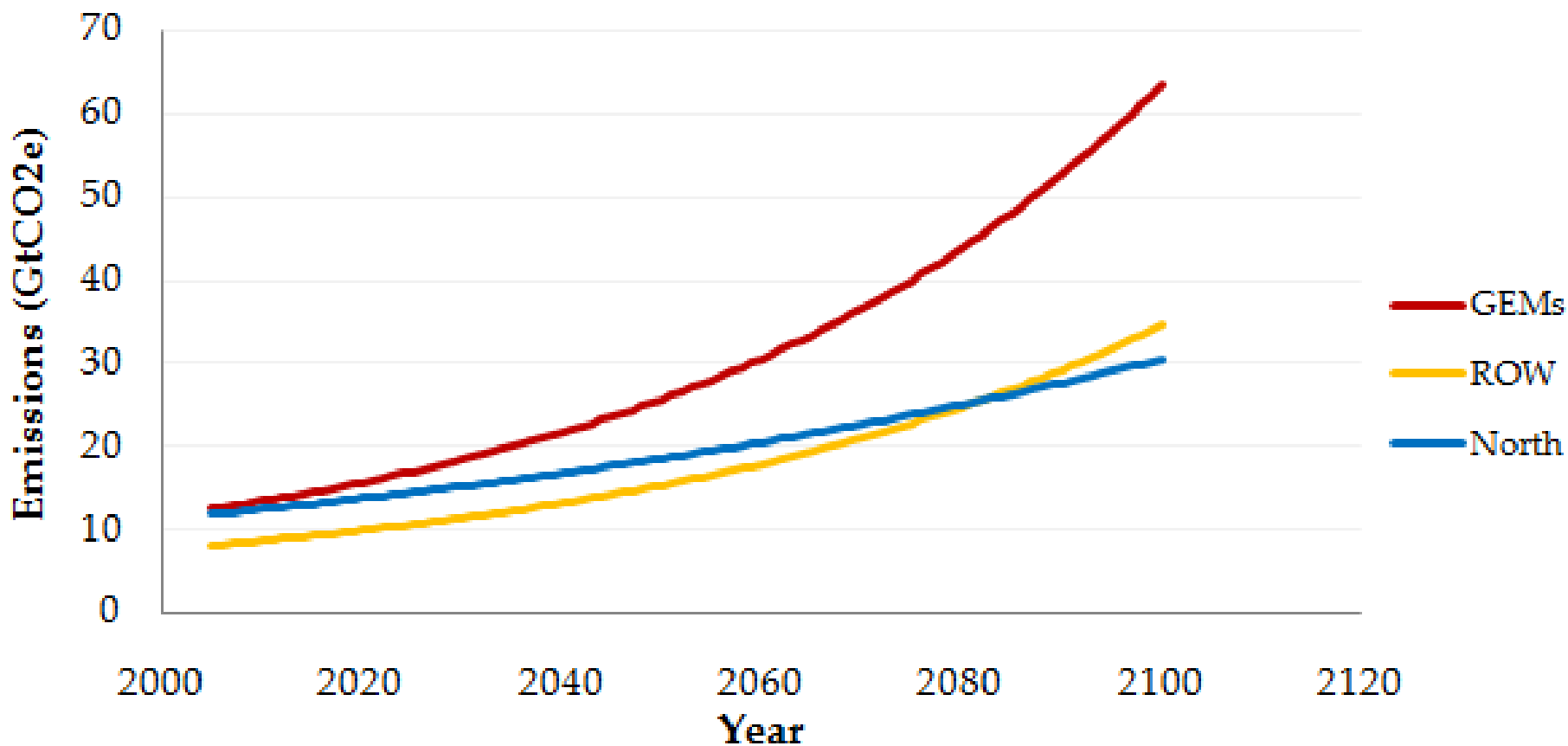
GEMs emit more GHGs than the North, and China emits more than the USA



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And GEM countries look set to increase their emissions very rapidly to 2100





Consider three scenarios

- **No deal:** business-as-usual, fossil fuel driven growth
- **North leads:** North takes action to cut emissions by 80% by 2050
- **North and GEM joint action:** In addition to North action, GEMs stabilise emissions at 2005 levels by 2050, and slow the rate of deforestation by 50%

Stabilising emissions in the GEMs does more than an 80% reduction by the North



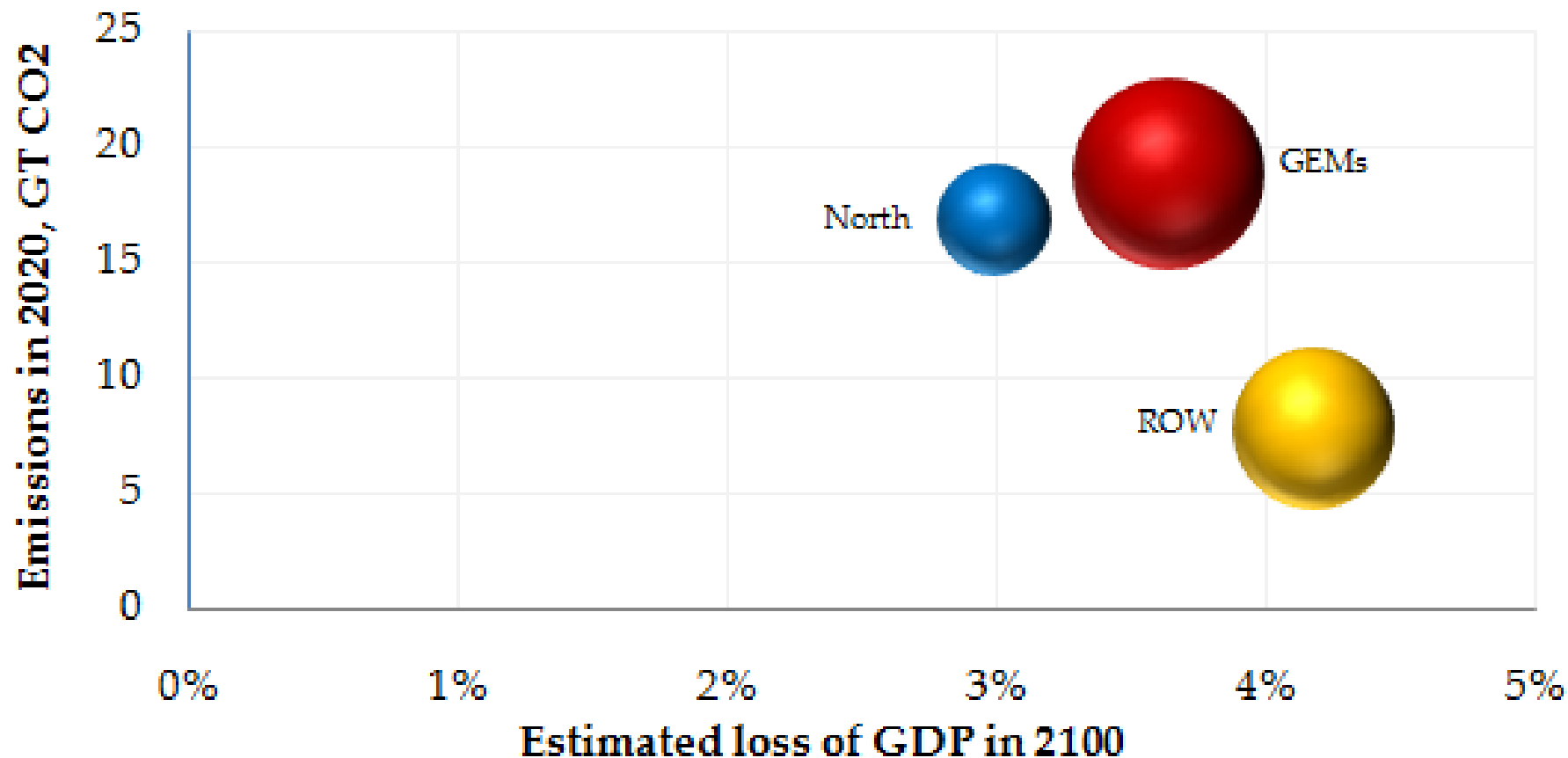
Results using the MAGICC model:

<i>Variable</i>	<i>No deal</i>	<i>North leads</i>	<i>North and GEMs joint action</i>
Average global temperature increase in 2100 (on 1990 levels), °C	4.6	3.9	2.7
Atmospheric concentrations of CO ₂ , parts per million	905	730	550
Sea level rise in 2100, cm above 1990 levels	48	41	32
Economic damages in 2100, % of GDP in GEMs:	3.0	2.3	1.5

GEMs have more to lose, and greater control over the global emissions pathway, than the North



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Bubble size proportional to 2008 population

So Northern willingness to finance GEMs is likely to be reasonably limited



- North will likely show continued countenance of the idea of supporting LDCs within ROW
- But North will likely not finance much mitigation or even adaptation action within GEMs
 - If \$100 billion p.a. is raised by 2020, it will go primarily to LDCs
 - China has already said it doesn't want the money
 - China doesn't need the money!
- But could action in the GEMs stimulate action in the North?



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China is investing US \$750 billion to grow their low-carbon sectors in the next ten years



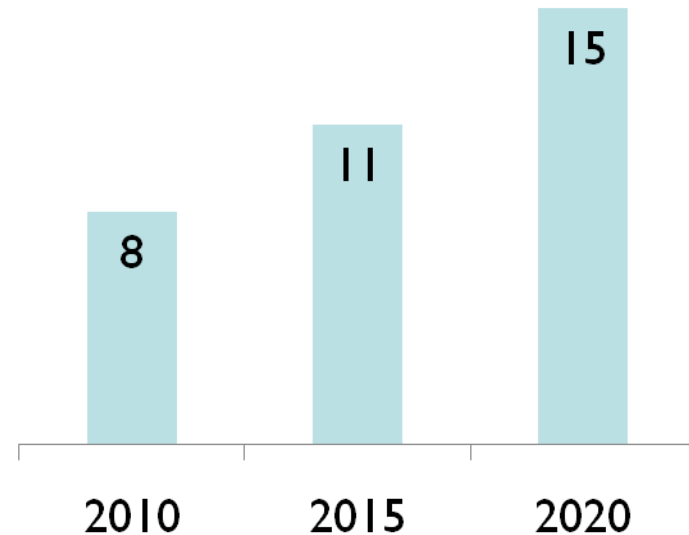
China is planning to invest ~\$750B in alternative energy over the next 10 years in:

- Developing renewables technology
- Improving transmission grid infrastructure
- Deploying additional nuclear capacity
- New energy cars
- Natural gas

In Q2 2010, investment in Chinese clean technology companies and projects total \$11.6 B, more than Europe and the US combined

Renewable energy targets for China

% of non-fossil based fuels



India is already imposing a modest “carbon tax” on coal and has other climate objectives



Emissions intensity target

- Reduce emissions intensity by 25% by 2020 on 2005 levels

Carbon tax

- India imposed a levy on coal in its 2010 budget on 1 July
- Tax is at 50 Rs/t coal = £0.70 /t coal
- It is expected to raise several hundred million annually for a clean energy fund

Trading scheme

- India will “soon” start piloting emissions trading for industrial pollution (August 31, 2010)
- Pilots in Gujarat and Tamil Nadu, as these states have large industry
- Focus is on real-time emission monitoring



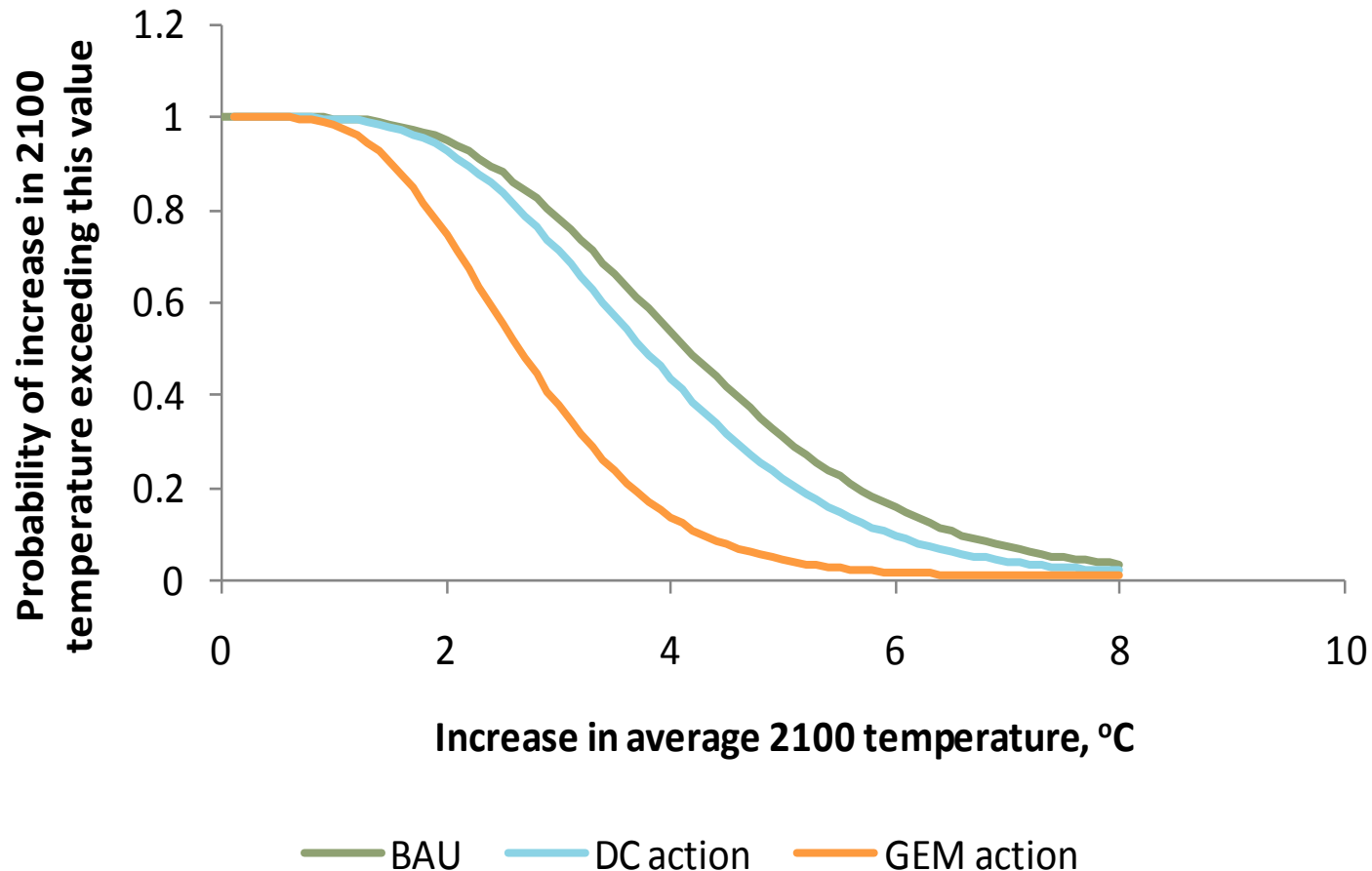
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There may be a 10% chance of temperatures increasing by 6°C without GEM action



- The probability of limiting temperature increases to 2°C, is lifted from 7% to 25% with GEM action





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Stranded assets (or no assets at all)

- Many capital stock investments (e.g. power plant) last for well over 30 years; confidence is required before investment
- If those investments are made assuming a zero carbon price, and average carbon prices over the next three decades are reasonable, then the assets could be uncompetitive

Carbon tariffs

- Various discussions have occurred in EU and US
- India’s carbon tax applies to imported coal as well as domestic coal



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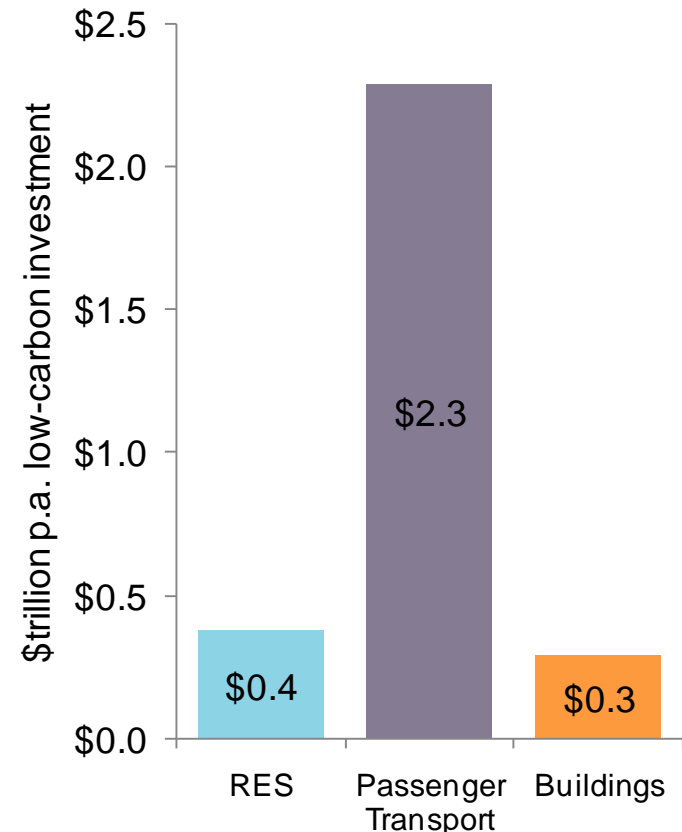
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The market for low-carbon energy, vehicles and buildings may be US \$3 trillion p.a. by 2050



- **New passenger vehicle technologies may provide the largest market opportunity**
- 50% reductions by 2050 require energy, passenger vehicles and buildings sectors to be transformed
- Although the energy sector is often the sector of policy focus, it is dwarfed by the size of the low-carbon transportation sector (measured in terms of annual value of investment)

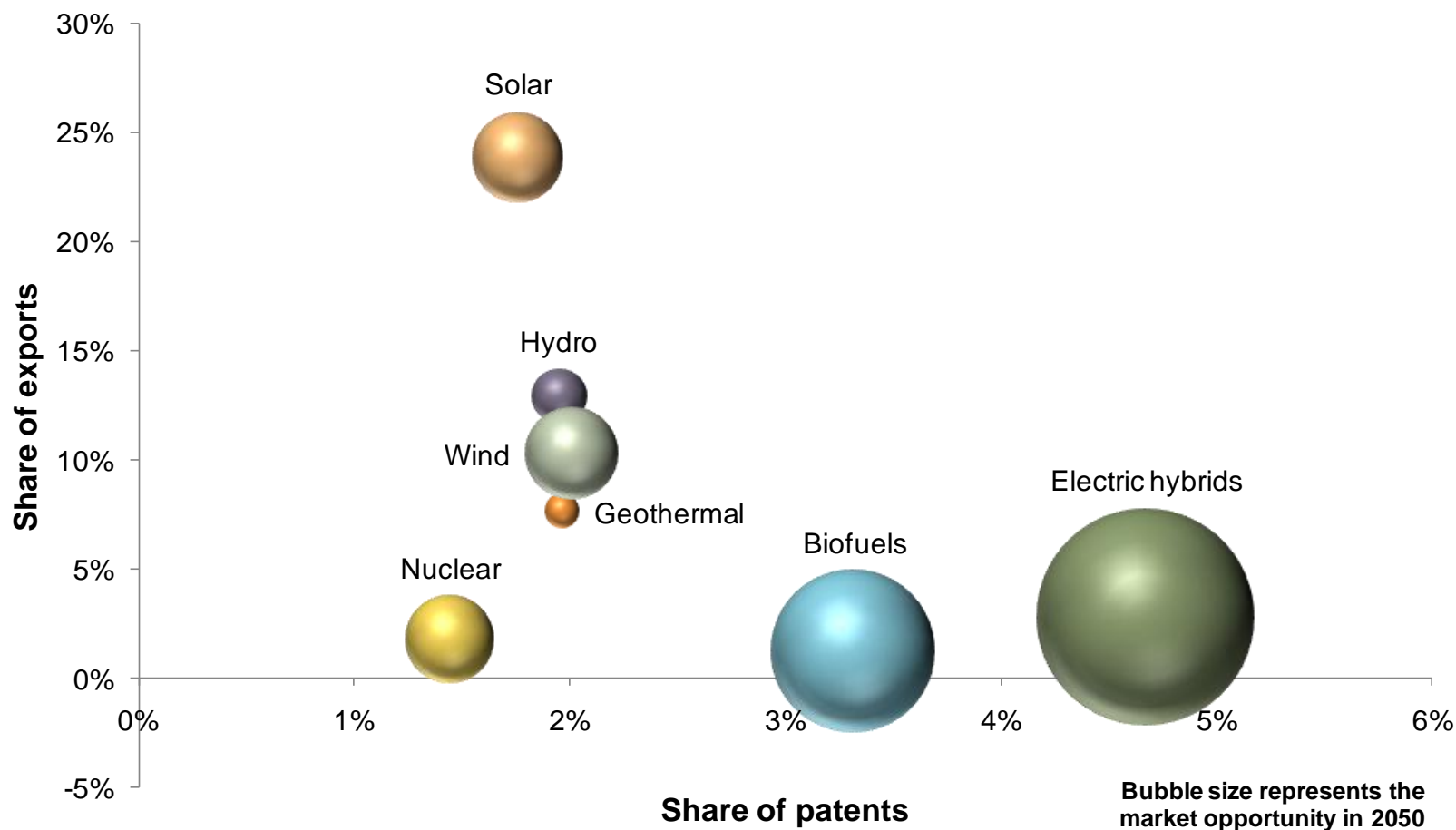
The low-carbon passenger transport market could be more than \$2 trillion in 2050



China appears to be positioning itself carefully for a low-carbon future



- China is already a global leader in the export of solar, wind, hydro and with significant patents in electric hybrids and biofuels



Source: exports: Vivid Economics analysis for Emerging Markets Forum. Comtrade (2009 data), patent data: Dechezlepretre (2010), market opportunity: IEA (2010).

Notes: share of exports is the share of value of exported products (in dollars at market exchange rates), products are renewable energy associated technologies as defined by ICTSD (2009) and ICTSD (2010); market opportunity data is for IEA BLUE Map scenario (50 per cent reduction on 2007 energy related CO₂ levels by 2050).



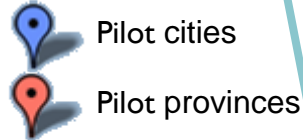
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China will almost certainly beat the USA to implementing a carbon trading scheme



China is beginning a pilot carbon trading program in 8 cities and 5 provinces



Pilot provinces : Guangdong, Hubei, Liaoning, Shaanxi, and Yunnan
Cities include: Tianjin, Chongqing, Hangzhou, Xiamen, Shenzhen, Guiyang, Nanchang, and Baoding

These pilots will help feed into a national domestic scheme

- China is expected to commit broadly to carbon trading during the ratification of its 2011-2015 Five Year Plan (March 2011), though details will likely be determined later (informed by pilots)
- Each area will be required to develop its own plan and market mechanism to reduce emissions in the near term
- Beijing and Shanghai are also independently working on trading schemes
- Domestic participation aids China's credibility in international discussions

Political and business leaders have been claiming that a “low-carbon race” will begin



- **President Obama:** “the nation that leads the clean energy economy will be the nation that leads the global economy. And America must be that nation.”
- **BHP Billiton CEO:** “Australia will need to have acted ahead of [global carbon pricing] to maintain its competitiveness”

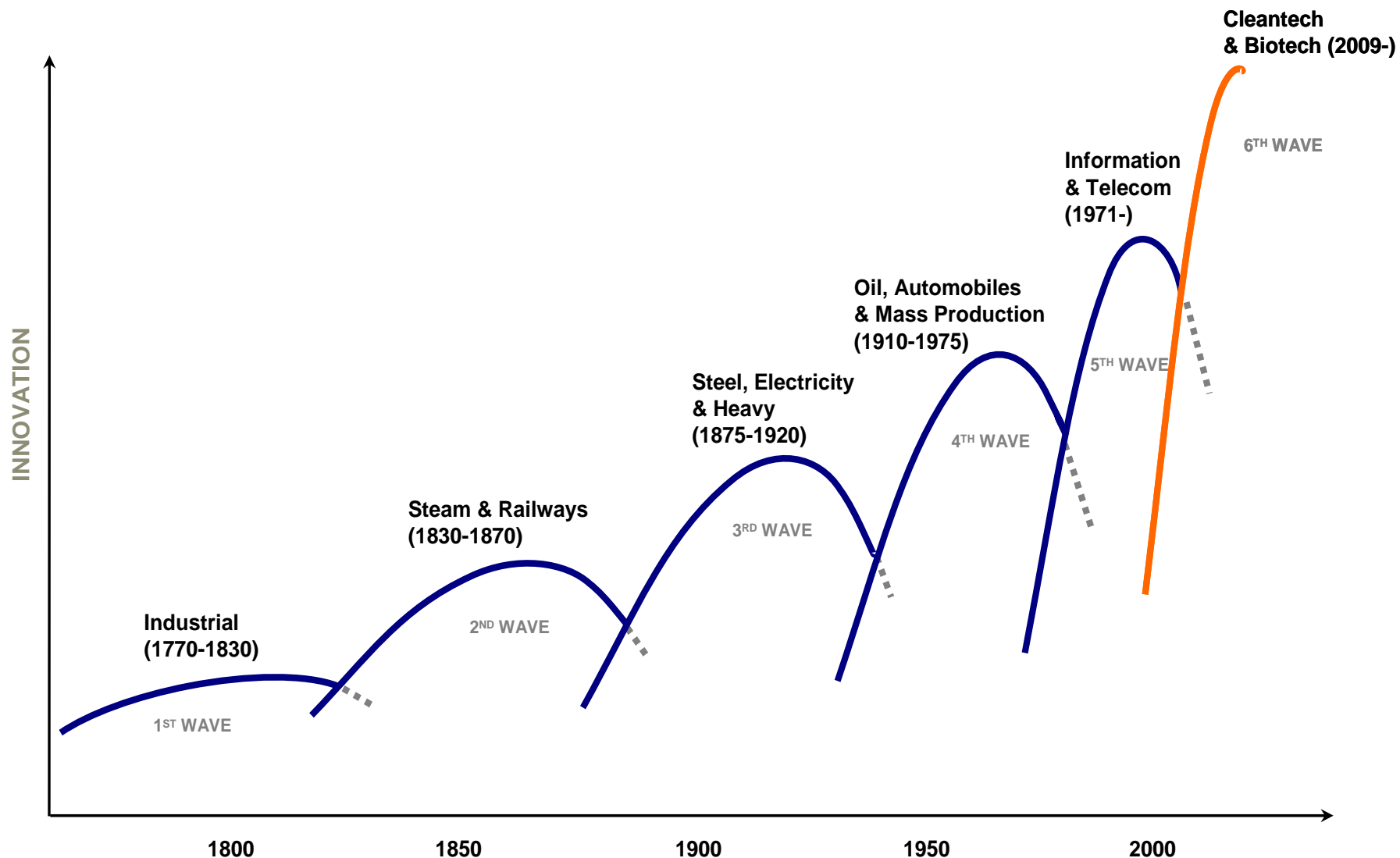


So do we need to collaborate or compete with other countries?



- **Both!**
- Climate change is complex enough that in some domains there are incentives to compete, and in others there are reasons to cooperate
- Competition – “low-carbon race”
 - Countries have incentives to ensure their citizens and firms secure and protect low-carbon IP, perhaps in areas like electric vehicles, smart grids/networks etc.
- Cooperation – “burden sharing”
 - Countries have an incentive to help other countries reduce their emissions
 - Rich countries have a moral sense of duty to support the poorest to adapt to climate change
- Need to determine which parts will resolve themselves with a small prod (because of competitive pressure) and which require coordination
- A PD can become a coordination game with tweaks in the payoff matrices (and this is not a simple PD to begin with)

This is a structural transition...scholars are exploring the analogy to an industrial revolution





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Conclusions

1. Emerging markets are critical to reducing emissions
 - They have a strong interest in so doing, and in stimulating the North to develop the technology they can deploy

2. They are already taking self-interested action rather than altruistic desire to support wealthier countries.
 - **Insurance:** action reduces the worst risks
 - **Costs of delay:** action now reduces stranded assets by 2030-2040
 - **Economic growth:** energy efficiency is a no brainer
 - **New markets:** potential US \$3 trillion p.a. by 2050 to get to 50%

3. The dynamics of interaction on climate is not just about cooperation
 - In some cleantech areas, we may be in the early stages of a “race”
 - If firms believe a “race” has begun, it probably has
 - Key in the North is the credible promise of future regulation